PARTIAL TRANSLATION OF JPP No.63-102638

Title of the Invention: Method for Producing Tea Drink
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2. Claim

A method for producing a tea drink, wherein a tea extract is treated with an enzyme, followed by an addition of alcohol to the treated liquid, subjected to solid-liquid separation, and subsequently, if necessary, removing the alcohol in the separated liquid.

As the enzyme, a saccharogenic conjugate enzyme mainly containing α-amylase and glucoamylase (as a commercialized product, for example, Riazyme (manufactured by Kyowa Miles), etc.) or pectinase (as a commercialized product, for example, Sucrase N (manufactured by Sankyo Seiyaku), etc.), is used solely or in combination. The used amount thereof is 2,500 U or more with respect to 100 g of solid content of the tea extract, but a desired amount of the enzyme is 25,000 U to 500,000 U if treatment efficiency or cost of the enzymes is considered.

When a dried tea extract is used, the treatment with the enzyme is performed after water is added to the dried extract.

The treatment with the enzyme is performed at 10 to 60°C, and preferably 20 to 35°C, for not less than one hour,

and preferably 10 to 24 hours, at pH 3 to 8, and preferably pH 4 to 7.

Test results

After (1) 2 g of Riazyme (240,000 U of α-amylase and 120,000 U of glucoamylase), (2) 2 g of Sucrase N (300,000 PGU of pectinase), or (3) no enzyme was added into 1 kg of oolong tea extract A-1 (manufactured by Kyowa Koryo), the mixture was left standing at 20°C for 24 hours (pH was not adjusted). After 1 L of 95 % ethanol was added into the mixture and stirred, the mixture was left standing at 20°C for 24 hours. After that, the mixture was centrifuged at 7000 rpm for 15 minutes and the amount of sediment separated (an amount of sediment generated) was determined.

The results are shown below;

Enzyme	Amount of Sediment Generated
(1) Riazyme	50
(2) Sucrase N	20
(3) No enzyme	592

As clearly shown from the results above, the amount of sediment generated is remarkably decreased by the enzyme treatments of the tea extract which is a raw material, compared with that of sediment produced without an enzyme treatment. As a result, the amount of discarded sediment is very small and the majority of the tea extract can be used effectively.

Examples are shown below.

Example 1

2 g of Riazyme (240,000 U of α-amylase and 120,000 U of glucoamylase) was added to 1 kg of oolong tea extract A-1 (21 % in terms of solid content) and left standing at 20°C for 24 hours (pH was not adjusted). After 1 L of 95 % ethanol was added into the mixture and stirred, the mixture was left at 20°C for 24 hours. After that, the mixture was centrifuged at 7000 rpm for 15 minutes and a supernatant thereof was obtained (an alcohol concentration of the supernatant was 48 %).

The supernatant was diluted with water to obtain a tea drink having an alcohol concentration of 5 %.

Meanwhile, each tea drink having an alcohol concentration of 5 % was prepared as a control case by the above-mentioned method except that (1) no enzyme treatment was performed or (2) neither enzyme treatment or the addition of alcohol (20°C for 24 hours) was carried out, followed by finally adding alcohol to obtain the product.

Examples 2 to 7

Tea dinks having an alcohol concentration of 5 % were obtained in the same way as Example 1, except that the enzymes shown in Table 1 were used instead of 2 g of Riazyme in Example 1.

Table 2

Example No.	Enzyme	Amount used (g)	Generation of sediment (at 5°C, room temperature, and 40°C)
2	Sucrase N	2 (300,000 PGU of Pectinase	No sediment generated at each of the temperature after 6 months
3	Riazyme Sucrase N	1 (120,000 U of α-amylase and 60,000 U of glucoamylase) 1 (150,000 U of PGU)	Same as above
4	Sucrase N	1 (150,000 PGU of Pectinase	Sedimentation generated at each of the temperature after 5 months
5	Riazyme	1 (120,000 U of α-amylase and 60,000 U of glucoamylase)	Same as above
6	Sucrase N	0.5 (75,000U of Pectinase	Sedimentation generated at each of the temperature after 1 month
7	Riazyme	0.5 (60,000 U of α-amylase and 30,000 U of glucoamylase)	Sedimentation generated at each of the temperature after 5 months

Regarding tea drinks obtained in Example 3, sake-tasting test was performed in the same way as Example 1. Also, Control 2 was the same one used in Example 1. The results are shown in Table 3.

Table 3

Tea Drink	Period for storage	Panel						
		A	B	C	D	E	F	Total
The method of the present invention	Immediately after sterilization	3	3	2	3	2	-	13
Control 2		3	3	3	2	3	-	14
The method of the present invention	After six months	3	2	3	2	3	2	15
Control 2		3	3	3	2	3	3	17

Example 12

After 0.1 g of Riazyme (12,000 U of α-amylase and 6,000 U of glucoamylase) and 0.1 g of Sucrase N (15,000 U of pectinase) were added to 100 ml of oolong tea extract A-1 (21 % in terms of solid content) and stirred, the mixture were left standing at 20°C for 24 hours. After that, 100 ml of 95.6 % ethanol was added into the mixture and stirred, the mixture was left standing at 20°C for 24 hours. The mixture was filtered with a membrane filter of 0.4 μm. 980 ml of water was added to 20 ml aliquot of the separated solution (an alcohol concentration of 47.4 %) and 1 L of diluted solution (an alcohol concentration of 0.9 %) was obtained. The diluted solution was again filtered with a 0.4 μm membrane filter, and a tea drink (containing 1 % of oolong tea extract A-1 (hereinafter, referred to the extract)) was obtained.

Meanwhile, as a control case, 100 ml of oolong tea extract A-1 was filtered with a 0.4 μm membrane filter. 990 ml of water was added to a 10 ml aliquot of the separated solution and 1 L of diluted solution was obtained. The diluted solution was filtered with a

membrane filter of 0.4 μm again, and a tea drink (containing 1 % of the extract; Control 1) was obtained.

In the same way as the method described above, after Riazyme and Sucrase N were added to 100 ml of oolong tea extract A-1 and stirred, the mixture was left standing at 20°C for 24 hours.

After that, the mixture was filtered with a 0.4 μm membrane filter. Using a 10 ml aliquot of the separated solution, a tea drink (containing 1 % of the extract; Control 2) was prepared in the same way as Control 1.

100 ml of 95.6 % ethanol was added to 100 ml of oolong tea extract A-1 and the mixture was left standing at 20°C for 24 hours.

After that, the mixture was filtered with a 0.4 μm membrane filter. Using a 20 ml aliquot of the separated solution, a tea drink (containing 1 % of the extract; Control 3) was prepared in the same way as the method of the present invention in Example 12.

The tea drink obtained by the method of the present invention (the tea drink of the present invention) and the tea drinks of Controls 1 to 3 were poured in a transparent bottle, sealed, and sterilized by heating at 65°C for 10 minutes. After that, the tea drinks were maintained in a stationary state at 5°C and the generation of sediment thereof was observed visually. The results are shown in Table 5.

Table 5

	1st week	2nd week	1st month	2nd month	3rd month	4th month	5th month	6th month
Tea drink of the present invention	−	−	−	−	−	−	−	−
Control 1	+	+	+	+	+	+	+	+
Control 2	−	±	+	+	+	+	+	+
Control 3	+	+	+	+	+	+	+	+

(Note)

−; No generation of sediment

±; Slight generation of sediment

+; Production of sediment

(Hereafter, the same evaluation method is used.)

As clearly shown from the table above, no sediment in the tea drink obtained by the method of the present invention was observed even after six months had passed.

Next, Tables 6 and 7 show the results of sensory evaluation for the tea drinks of the present invention and Controls 1 to 3, immediately after sterilization and after storage for six months.

Table 6 Sensory evaluation immediately after sterilization

	Panel							
	A	B	C	D	E	F	Total	Average
Tea drink of the present invention	3	2	3	3	3	2	15	2.5
Control 1	3	2	3	2	3	3	17	2.8
Control 2	3	2	3	2	3	2	15	2.5
Control 3	3	2	3	3	3	3	17	2.8

Table 7 Sensory evaluation after storage for six months

	Panel							
	A	B	C	D	E	F	Total	Average
Tea drink of the present invention	2	2	3	2	2	3	14	2.3
Control 1	4	3	4	3	3	3	20	3.3
Control 2	3	3	4	3	3	3	19	3.2
Control 3	3	3	4	3	3	3	19	3.2

As clearly shown in Tables 6 and 7, there is almost no difference in the sensory evaluation between the tea drink obtained by the present invention and Controls 1 to 3 immediately after sterilization, but after storage for six months, the tea drink obtained by the method of the present invention shows a better property in the sensory evaluation.